

## SIGNIFICANT RANGE EXTENSIONS FOR SOUTHWESTERN NEARCTIC MAYFLIES (EPHEMEROPTERA: BAETIDAE)<sup>1</sup>

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**ABSTRACT:** Records are provided for five southwestern North American (including Mexico) species of Ephemeroptera by way of initial reports of *Camelobaetidium similis* from California and the USA, *Cloeodes peninsulus* from Arizona and the USA, *C. excogitatus* from Oregon, *Homoeonueria alleni* from Montana, and *Lachlania saskatchewanensis* from Nebraska. All records represent notable northern range extensions, except for the record of *L. saskatchewanensis*, which is an eastern range extension within the USA. Short discussions regarding the significance of these distributional data are also provided.

In the following we provide new state records and range extensions northward or eastward for five Nearctic mayfly species that are mainly southwestern in distribution, including Mexico, and whose major generic biogeographic affinities are thought to be Neotropical (e.g., McCafferty 1998). The species reported here belong to taxa that currently are not undergoing revisionary work and are not planned to be the subject of such research in the near future. Furthermore, because the distributional data are pertinent for the Ephemeroptera of North America project in establishing species ranges, and thereby expanding the bases upon which the environmental status of such species may be established, it is important to make such data available at this time. Voucher specimens of samples recorded here are deposited in the Purdue Entomological Research Collection, West Lafayette, Indiana.

*Camelobaetidium similis* Lugo-Ortiz and McCafferty (Baetidae). This species has been known only from Mexico, including the following Mexican states: Guerrero (Lugo-Ortiz and McCafferty 1995), from where it was originally described; Tamaulipas (Wiersema and Baumgardner 2000); and Oaxaca, Sinaloa, and Sonora (Randolph and McCafferty 2000). A new record for California and therefore also the first record for the USA is as follows:

Larva, California, Plumas Co., North Fork Feather R., IX-2001.

The new record represents a significant, somewhat disjunct range extension into northern California. Whereas *C. similis* appears well-represented in Mexico, only the further study of California mayfly fauna will determine any possible environmental risk status associated with *C. similis* in that state. The only other nominal species of *Camelobaetidium* Demoulin that has been known from California is *C. warreni* (Traver and Edmunds), which was reported only

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from Stanislaus County, in central California by Traver and Edmunds (1968), but which is widespread throughout much of the West and can be common in areas such as southern Utah and western Nebraska (McCafferty and Randolph 2000, McCafferty et al. 2001).

*Cloeodes peninsulus* Waltz and McCafferty (Baetidae). This distinctive species has been known previously only from the larval type material taken in the Mexican state of Baja California Sur (Waltz and McCafferty 1987). A new record for Arizona and therefore also the first record for the USA is as follows:

Larvae, Arizona, Cochise Co., unnamed intermittent Rucker Canyon stream, from Campground at fenceline, above Rucker Lake, VI-1-2000, K. Palmer and D. McCarty.

Other *Cloeodes* Traver larvae have also been taken from pools (either seasonal or daily) along streams, both in North America (*C. macrolamellus* Waltz and McCafferty from remnant pools along the ephemeral Cherry Creek, north of Silver City, New Mexico) (Waltz and McCafferty 1987) and in South America (the remarkable *C. hydration* McCafferty and Lugo-Ortiz—a species which is capable of tolerating periodic dehydration—from daily spring pools along a tributary of the Rio Bento Gomes in Mato Grosso, Brazil) (McCafferty and Lugo-Ortiz 1995, Nolte et al. 1996). Because of the very low number of its known occurrences, *Cloeodes peninsulus* should be considered a possibly imperiled species in North America.

*Cloeodes excogitatus* Waltz and McCafferty (Baetidae). This species was originally described from larvae taken at Oak Creek Canyon near Flagstaff, Arizona (Waltz and McCafferty 1987). More recently larvae were reported from northern California by Waltz et al. (1998), thus providing the furthest northern Western Hemisphere record of *Cloeodes*, a genus which is essentially circumtropical (see Lugo-Ortiz and McCafferty 1999). We are now able to extend the known range of this species, and genus, even further north into Oregon as follows:

Larvae, Oregon, Josephine Co, South and North Forks of Rough and Ready Cr. and "Alberg" Cr., T40S R9W S16, 11-1997, D. Perez, deposited in the collection of EcoAnaysts, Inc., Moscow, Idaho.

*Homoeoneuria alleni* Pescador and Peters (Oligoneuriidae). This species was originally described from Chihuahua (Mexico), New Mexico, and Utah (Pescador and Peters 1980). More recently it was reported from Colorado by Durfee and Kondratieff (1994). The following new record data indicate that this western species extends into the northwest plains:

Larvae, Montana, Prairie Co., mouth of the Powder R., VIII-13-1999, D. Gustafson.

Although apparently of Neotropical origin (Pescador and Peters 1980), the genus *Homoeoneuria* Eaton is most diverse in North America and demonstrates a North American distribution pattern that further suggests relatively old austral affinities (McCafferty et al. 1992, McCafferty 1998) (not the typi-

cal post-Pleistocene distributional patterns demonstrated by most austral groups presently in North America). Larvae are found in sand substrates in flowing waters (e.g. Pescador and Peters 1980, Klubertanz and Hess 2001) in the Midwest and Southeast, and in parts of the Intermountain West, where the genus is represented by *H. alleni*.

*Homoeoneuria ammophila* (Spieth) has been known from midwestern areas of North America (see McCafferty and Hubbard 1998, Randolph and McCafferty 1998), and recently was reported as far west as western Nebraska (McCafferty et al. 2001). This is relatively near to the eastern Montana area from where we report *H. alleni*, and although we presume the two species to be allopatric in the northern Great Plains, it is not without precedent that certain western mayflies found in sandy bottomed rivers may range into central Nebraska (see below).

*Lachlania saskatchewanensis* Ide (Oligoneuriidae). This species demonstrates a broader western North American distribution than other species treated herein, occurring from Saskatchewan to Mexico (see e.g., McCafferty et al. 1997). It is one of several species that demonstrates a classic distribution pattern seen in certain western species that ranges from the lower Colorado River Drainage System to the Saskatchewan River Drainage System, and usually includes the upper Green River Subsystem in the area where Colorado, Utah, and Wyoming all meet (see Lehmkuhl 1976, McCafferty 2001, Webb et al. 2002). We are able to extend the known range of *L. saskatchewanensis* to the north central Great Plains of the USA as follows:

Larvae, Nebraska, Blaine Co., Dismal R. at Hwy 2 south of Dunning, VII-26-2001; male adults, Nance Co., Loup R. at Hwy 14 S of Fullerton, VII-28-2001, Kondratieff and Zuellig (adults at Colorado State University).

The overall range of *L. saskatchewanensis* is not a distributional pattern common to most western mayfly species; however, it is explicable at least for some species associated with sandy bottomed streams because there evidently has been connections between the Rocky Mountain region, for example, in northern Colorado, with the upper Great Plains via the Platte River Drainage System.

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#### LITERATURE CITED

- Durfee, R. and B. C. Kondratieff. 1994. New additions to the inventory of Colorado mayflies (Ephemeroptera). *Entomol. News* 105: 222-227.
- Klubertanz, T. H. and C. R. Hess. 2001. Additional Illinois and Wisconsin mayfly records, including *Homoeoneuria ammophila* (Ephemeroptera: Oligoneuriidae) in Illinois. *Entomol. News* 112: 254, 284.

- Lehmkuhl, D. M. 1976. Additions to the taxonomy, zoogeography, and biology of *Analetris eximia* (Acanthametropodinae: Siphonuridae: Ephemeroptera). *Can. Entomol.* 108: 199-207.
- Lugo-Ortiz, C. R. and W. P. McCafferty. 1995. Taxonomy of the North and Central American species of *Camelobaetidius* (Ephemeroptera: Baetidae). *Entomol. News* 106: 178-192.
- Lugo-Ortiz, C. R. and W. P. McCafferty. 1999. Global biodiversity of the mayfly family Baetidae (Ephemeroptera): a generic perspective. *Trends Entomol.* 2: 45-54.
- McCafferty, W. P. 1998. Ephemeroptera and the great American interchange. *J. N. Am. Benthol. Soc.* 17: 1-20.
- McCafferty, W. P. 2001. Commentary on *Ametropus* species (Ephemeroptera: Ametropodidae) in North America. *Gr. Lakes Entomol.* in press.
- McCafferty, W. P. and T. Hubbard. 1998. Additions to Iowa mayflies (Ephemeroptera). *Entomol. News* 109: 268.
- McCafferty, W. P. and C. R. Lugo-Ortiz. 1995. *Cloeodes hydation* n. sp.: an extraordinary drought tolerant mayfly from Brazil (Ephemeroptera: Baetidae). *Entomol. News* 106: 19-28.
- McCafferty, W. P. and R. P. Randolph. 2000. Further contributions to the spatulate clawed Baetidae (Ephemeroptera). *Entomol. News* 111: 259-264.
- McCafferty, W. P., R. W. Flowers, and R. D. Waltz. 1992. The biogeography of Mesoamerican mayflies. Pp. 173-193. *In*: S. P. Darwin and A. L. Weldon (eds.). *Biogeography of Mesoamerica: proceedings of a symposium.* Tulane Stud. Zool. Bot., Suppl. Publ. No. 1, New Orleans.
- McCafferty, W. P., T. H. Klubertanz, R. P. Randolph, A. V. Provonsha, H. R. Lawson, and B. C. Kondratieff. 2001. Mayflies (Ephemeroptera) of the Great Plains. I: Nebraska. *Trans. Am. Entomol. Soc.* 127: 5-29.
- McCafferty, W. P., C. R. Lugo-Ortiz, and G. Z. Jacobi. 1997. Mayfly fauna of New Mexico. *Gr. Basin Natural.* 57: 283-314.
- Nolte, U., R. S. Tiethöhl, and W. P. McCafferty. 1996. A mayfly from tropical Brazil capable of tolerating short-term dehydration. *J. N. Am. Benthol. Soc.* 15: 87-94.
- Pescador, M. L. and W. L. Peters. 1980. A revision of the genus *Homoeoneuria* (Ephemeroptera: Oligoneuriidae). *Trans. Am. Entomol. Soc.* 106: 357-393.
- Randolph, R. P. and W. P. McCafferty. 1998. Diversity and distribution of the mayflies (Ephemeroptera) of Illinois, Indiana, Kentucky, Michigan, Ohio, and Wisconsin. *Ohio Biol. Surv. Bull., New Ser.* 13(1): vii + 1-188.
- Randolph, R. P. and W. P. McCafferty. 2000. Mexican mayflies: inventory and additions (Ephemeroptera). *Ann. Limnol.* 36: 113-121.
- Traver, J. R. and G. F. Edmunds, Jr. 1968. A revision of the Baetidae with spatulate-clawed nymphs (Ephemeroptera). *Pac. Insects* 10: 629-677.
- Waltz, R. D. and W. P. McCafferty. 1987. Revision of the genus *Cloeodes* Traver (Ephemeroptera: Baetidae). *Ann. Entomol. Soc. Am.* 80: 191-297.
- Waltz, R. D., P. Ode, and J. Lee. 1998. *Cloeodes excogitatus* (Ephemeroptera: Baetidae) in northern California. *Entomol. News* 109: 215.
- Webb, J. M., W. P. McCafferty, and D. M. Lehmkuhl. 2002. The larval stage of *Heptagenia adaequata* (Ephemeroptera: Heptageniidae). *Entomol. News* in press.
- Wiersema, N. A. and D. E. Baumgardner. 2000. Distributional and taxonomical contributions to the Ephemeroptera fauna of Mexico and Central America. *Entomol. News* 111: 60-66.